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ConocoPhillips
Alaska

August 31, 2017

Certified Mail
Return Receipt Requested
7014 0150 0000 6333 2199

Don Dossett
U.S. EPA Region 10, Mail Stop: OCE-101
1200 Sixth Avenue, Suite 900
Seattle, WA 98101

Subject: ConocoPhillips Alaska, Inc. Alternative Monitoring Request pursuant to New Source Performance Standards Subpart OOOOa Well Site Leak Detection and Repair Requirements

Dear Mr. Dossett:

ConocoPhillips Alaska, Inc. (CPAI) has enclosed with this letter an Alternative Monitoring Request (AMR) for New Source Performance Standards (NSPS) pursuant to 40 CFR §60.13(i) for the Environmental Projection Agency's (EPA) approval. CPAI's crude oil production operations on the North slope of Alaska experience a unique ambient operating environment which creates technical feasibility issues for operating the Well Site Leak Detection and Repair (LDAR) monitoring equipment mandated by NSPS Subpart OOOOa. The enclosed request proposes an alternative to the mandated monitoring equipment and procedures.

Given the eminence of low ambient temperatures on the North Slope, CPAI would appreciate a response to this request by October 15, 2017.

If you have any questions or require additional information, please call me at (907) 265-6937.

Sincerely,

Laura K. Perry
Coordinator – Air Quality

Enclosure

cc: Hahn Shaw (EPA)
Dave Bray (EPA)
John Pavitt (EPA)
Dianne Solderlund (EPA)

1.0 Introduction and Objective

ConocoPhillips Alaska Inc. (CPAI) hereby submits the following request for the United States Environmental Protection Agency (USEPA) to approve an Alternative Monitoring Request (AMR) pursuant to 40 CFR §60.13(i) for the Well Site Leak Detection and Repair (LDAR) requirements established in the New Source Performance Standards for Crude Oil and Natural Gas Facilities for which Construction, Modification, or Reconstruction Commenced after September 18, 2015 Subpart OOOOa (NSPS OOOOa).

2.0 NSPS OOOOa LDAR Requirements

NSPS OOOOa establishes LDAR requirements for fugitive emission components (fugitive components) located at Well Sites associated with the drilling and subsequent operation of any oil well, natural gas well, or injection well [§60.5365a(i)].

Well Sites are subject to two types of LDAR monitoring surveys:

1. Initial Monitoring Survey
2. Routine Monitoring Survey

Operators must complete Initial Monitoring Surveys within 60 calendar days of the "startup of production" or first day of production (FDOP) depending on whether the well site is a "new" well site or a "modified" well site [§60.5397a(f)(1)].

Following completion of the Initial Monitoring Survey at the well site affected facility, NSPS OOOOa requires semi-annual Routine Monitoring Surveys. Consecutive semi-annual Routine Monitoring Surveys must be separated by at least 4 months [§60.5397a(g)(1)].

LDAR monitoring surveys must be completed using one of the following techniques [§60.5397a(c)(2)]:

1. Optical Gas Imaging (OGI)
2. USEPA Method 21 (Method 21) at 40 CFR Part 60, appendix A-7

3.0 CPAI Alaska North Slope Operations

CPAI operates crude oil production facilities on the North Slope of Alaska (North Slope). Crude oil is produced from multiple satellite drill sites which are connected via multi-phase pipelines (containing oil, water, and gas) to central processing facilities (CPF).

Drill sites contain a combination of surface equipment located in enclosure buildings such as piping manifolds, wellheads, and freeze protection storage.

Drill sites also contain distribution modules and surface equipment directly exposed to the atmosphere such as line heaters and piping.

Some enclosure buildings maintain higher than ambient temperatures due to heated radiated from high temperature process streams (e.g. manifold buildings) while other enclosures are only designed to shield workers from ambient conditions such as wind and snow and operate at internal temperatures close to the ambient.

Figure 1 depicts a site layout of typical North Slope drill site.

Figure 1. Typical North Slope Drill Site

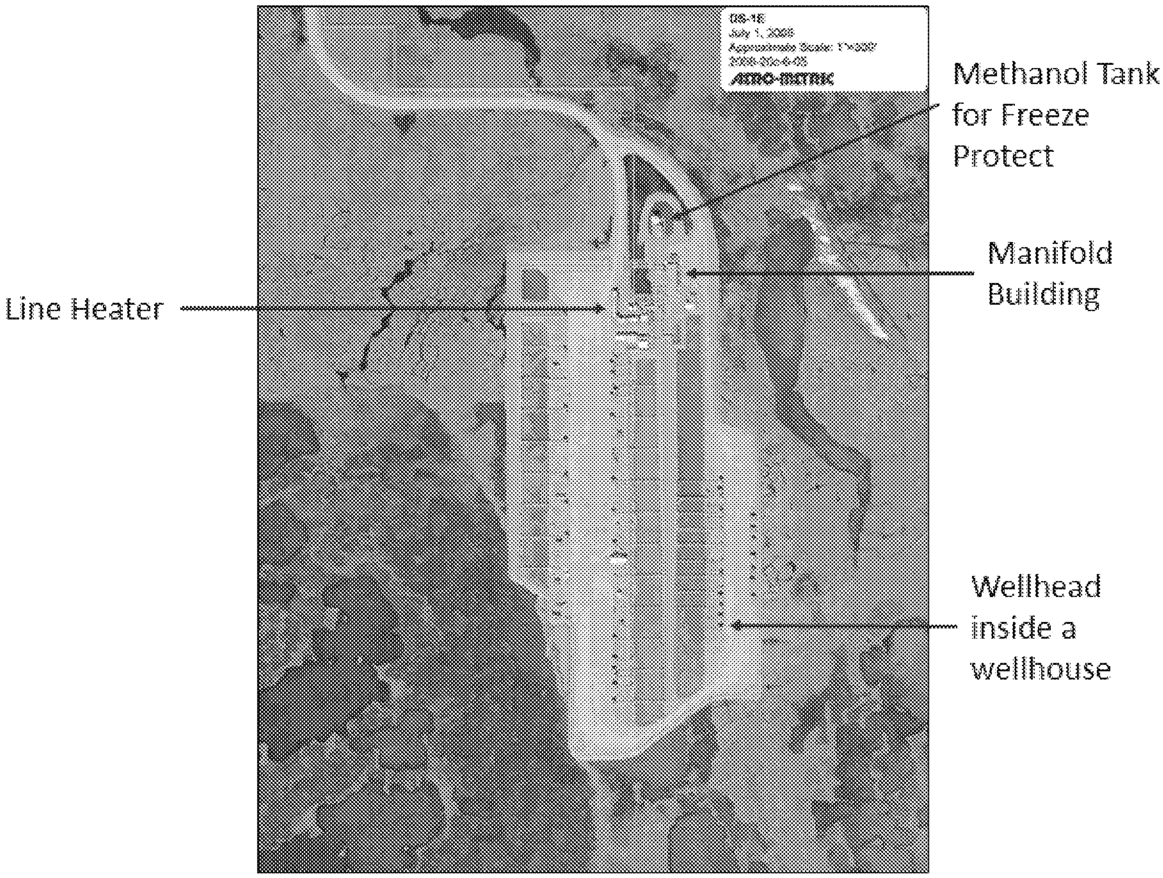
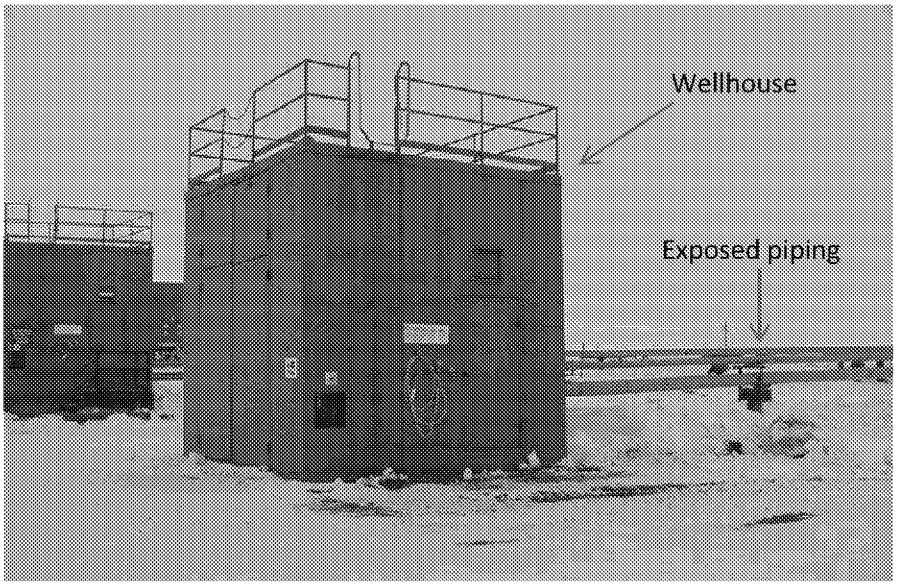


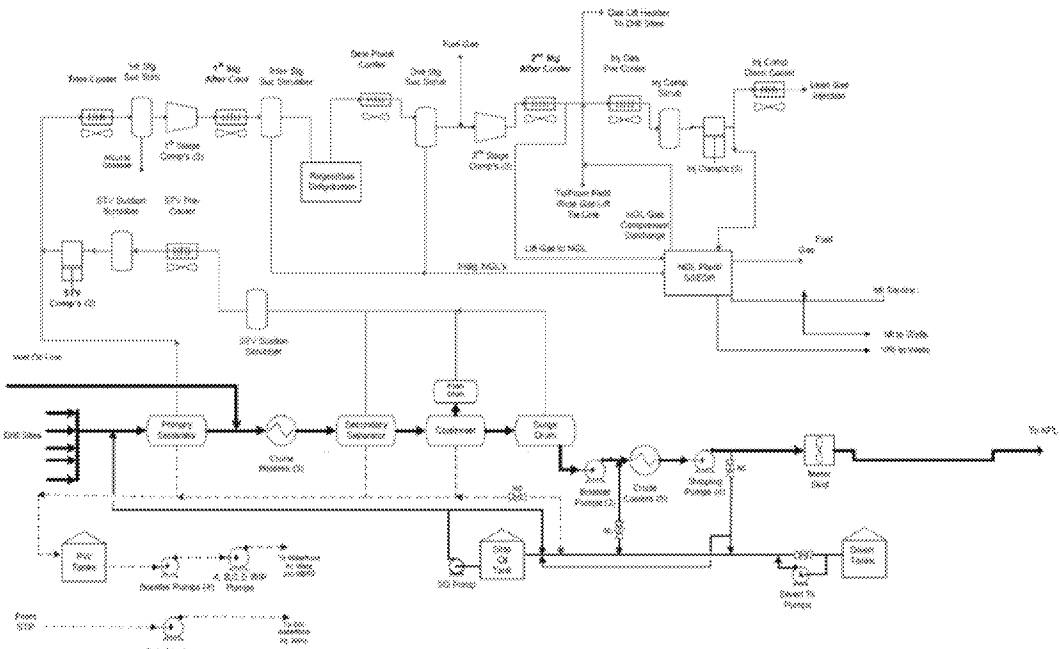
Figure 2 shows an example of a North Slope drill site wellhead and an exposed piping manifold collecting material from the drill site wellheads. The wellhead is housed in a building to shield the equipment from the environment.

Figure 2. Example North Slope Wellhouse



Multi-phase fluids are separated into their oil, water, and gas constituents at CPFs for final treatment to produce crude oil of sufficient quality for sale (sales crude). The sales crude is piped directly from the CPF to Pump Station 1 of the TransAlaska Pipeline System (TAPS) where the oil is subsequently piped to Valdez, AK for shipment to end-use markets.

Figure 3 shows a simplified diagram of a North Slope CPF.



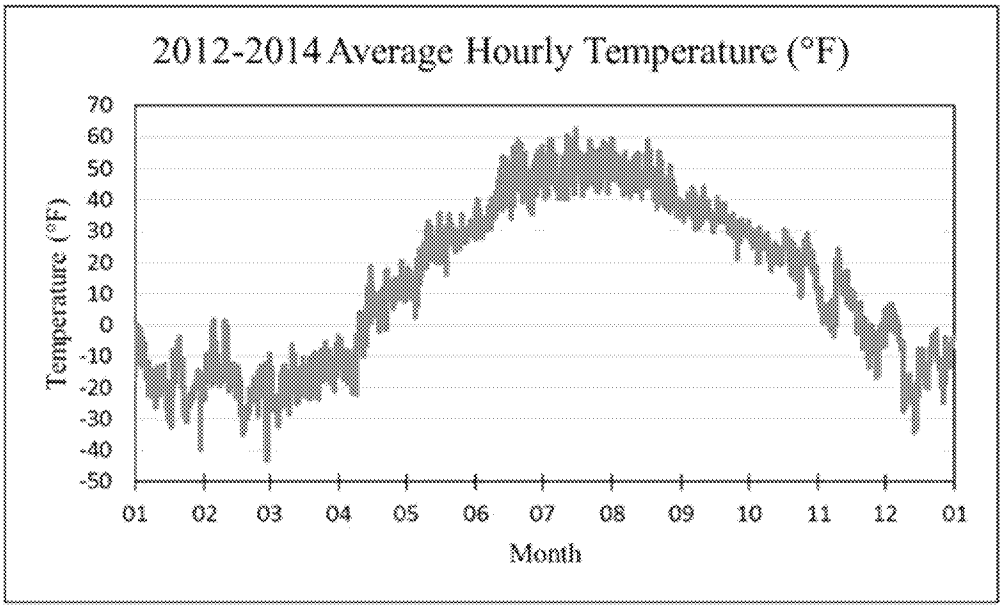
The North Slope of Alaska is the area between the Brooks Range and the Arctic Ocean. It is located entirely above the Arctic Circle. North Slope operations are subjected to unique, harsh environments including:

- Extended wintertime durations throughout calendar year as compared to geographies in the lower 48 contiguous United States (L48)
- Persistent wintertime ambient temperatures below 0 degrees Fahrenheit (°F)
- Consistent ambient wind conditions in the excess of 10 miles per hour (mph)
- Snow ground cover typically from September to June each year (10 months out of the year)

Snow cover combined with low temperatures and high winds can create extremely hazardous working environments referred to "phase conditions" where reduced visibility ground level travel restrictions are implemented for the safety of our personnel. Phase conditions can occur on more than 30% of the days in the months from October to May.

Figure 4 shows the ambient temperature measured from a meteorological station located at CPAI's CD1 Air Quality Monitoring Station from 2012 through 2014.

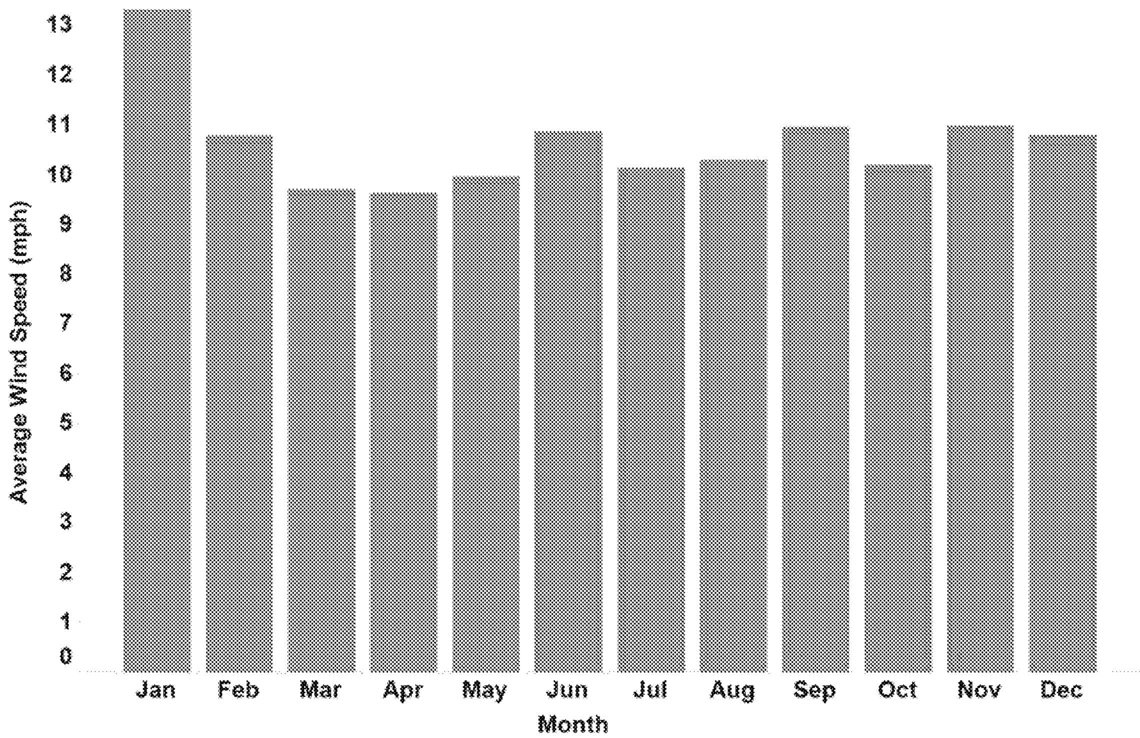
Figure 4. North Slope Ambient Temperature Measurements



As show from Figure 4, ambient temperatures can get to as low as -40 °F and are below 0 °F for over 5 months of the calendar year.

Figure 5 provides measured ambient wind speed date for North Slope operations from the period of 2012 to 2012 at the Alpine CD2 Monitoring Station.

Figure 5. Average Wind Speed for 2014



4.0 Challenges

The unique ambient operating environmental of the North Slope creates technical feasibility issues for operating the LDAR monitoring equipment mandated by NSPS OOOOa.

OGI manufacturers have documented that gas imaging cameras are not designed to operate below -4 °F ambient temperatures [see Appendix A].

Similarly, FID and PID manufacturers have also indicated that their equipment cannot function below -4 °F [see Appendix B].

As shown from Figure 4, ambient temperatures are typically below 0 °F between the months of November and April. CPAI will refer to this as the Low Ambient Temperature Exclusion Period (LATEP).

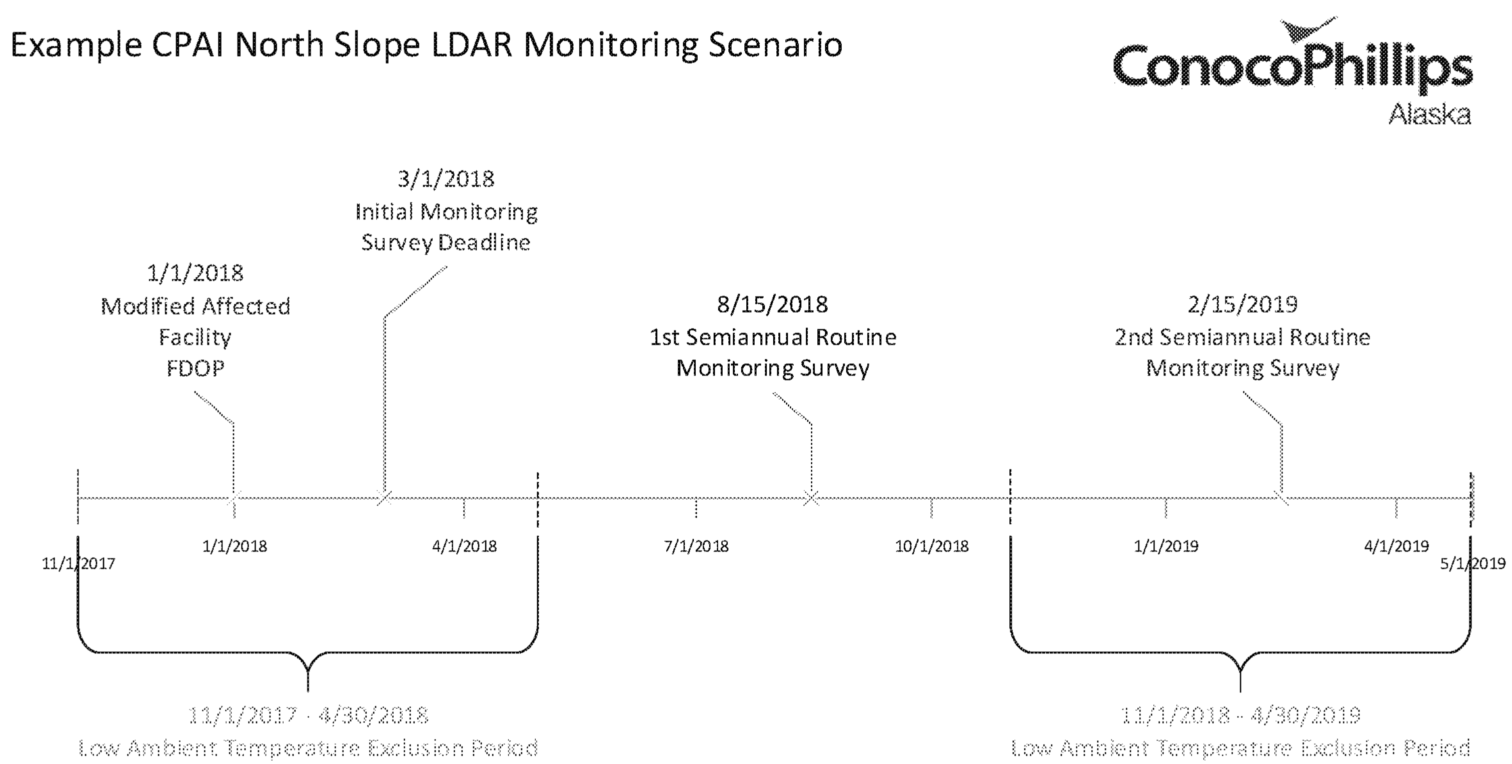
The active drilling and completion season for CPAI is year-round. As mentioned above, new well site affected facilities are required to complete Initial Monitoring Surveys within 60 calendar days of either "startup of production" or FDOP (as applicable).

It will be technically infeasible to use OGI or Method 21 equipment to survey fugitive components located outside of heated enclosures for any 60-day Initial Monitoring Survey deadlines which occur from November to April.

Additionally, it will also be technically infeasible to conduct Routine Monitoring Surveys separated by 4 months which fall within period of November to April (i.e. LATEP).

Figure 6 provides a foreseeable example scenario of the challenges associated with conducting Routine Monitoring Surveys on the North Slope.

Figure 6. Example of Technical Infeasibility of LDAR Monitoring Instruments due to Arctic Conditions



Red = regulatory monitoring survey deadlines that are technically infeasible to use OGI/Method 21 instruments at NHE locations

Black = regulatory monitoring deadlines where it is technically feasible to use OGI/Method 21 instruments at NHE locations

5.0 Implications

The unique arctic operating environment provides a small operating timeframe throughout the calendar year where it is technical feasible to conduct monitoring surveys using the NSPS OOOOa-mandated monitoring devices (i.e. OGI or Method 21 instruments), though surveys can be delayed due to non-temperature weather related factors (i.e. wind) and pushing the surveys into the LATEP. CPAI will not be able to comply with the NSPS OOOOa Initial Monitoring Survey and Routine Monitoring Survey requirements as currently established in the Rule.

Failure to complete the required Initial Monitoring Surveys and Routine Monitoring Surveys will be a deviation from NSPS OOOOa. Additionally, CPAI's North Slope operations are subject to the federal Title V operating permit program. CPAI will need to incorporate the applicable NSPS OOOOa requirements into their Title V operating permits. Deviations from NSPS OOOOa will not allow CPAI to certify compliance as part of the required annual compliance certifications.

6.0 Alternative Monitoring Request

Part 60 Subpart A provides a mechanism for owners or operators of affected facilities to submit a written application to petition the USEPA (Administrator) to allow alternatives to any monitoring procedures or requirements in Part 60 [§60.13(i)]

In light of the physical limitations for operating OGI and Method 21 instruments in arctic temperatures below their design capabilities, CPAI proposes the following alternative.

A. Affected facility operating areas will be designated as one of the following:
   i. Fugitive emission components in "heated enclosures" (HEC)
   ii. Fugitive emission components in "non-heated or open environments" (NHE)
      - HEC locations include: drill site manifold, test separator, chemical injection, pump, line heater manifold, emergency shutdown, pigging modules, etc.
      - NHE locations include: drill site line heaters; un-heated well houses; storage tanks; well dedicated, diesel and chemical, and cross country piping; injection headers; etc.

B. Initial Monitoring Surveys
   i. HEC Locations: complete Initial Monitoring Surveys using OGI or Method 21 instruments within 60 days of "start of production" or FDOP as applicable
   ii. NHE Locations: completed audible, visual, or olfactory (AVO) inspections within "startup of production" or FDOP as applicable when the deadline falls within the LATEP. Initial Monitoring Surveys that do not occur within the LATEP will use OGI or Method 21.

C. Routine Monitoring Surveys
   i. HEC Locations: complete Routine Monitoring Surveys using OGI or Method 21 instruments semi-annually with consecutive surveys separated by 4 months

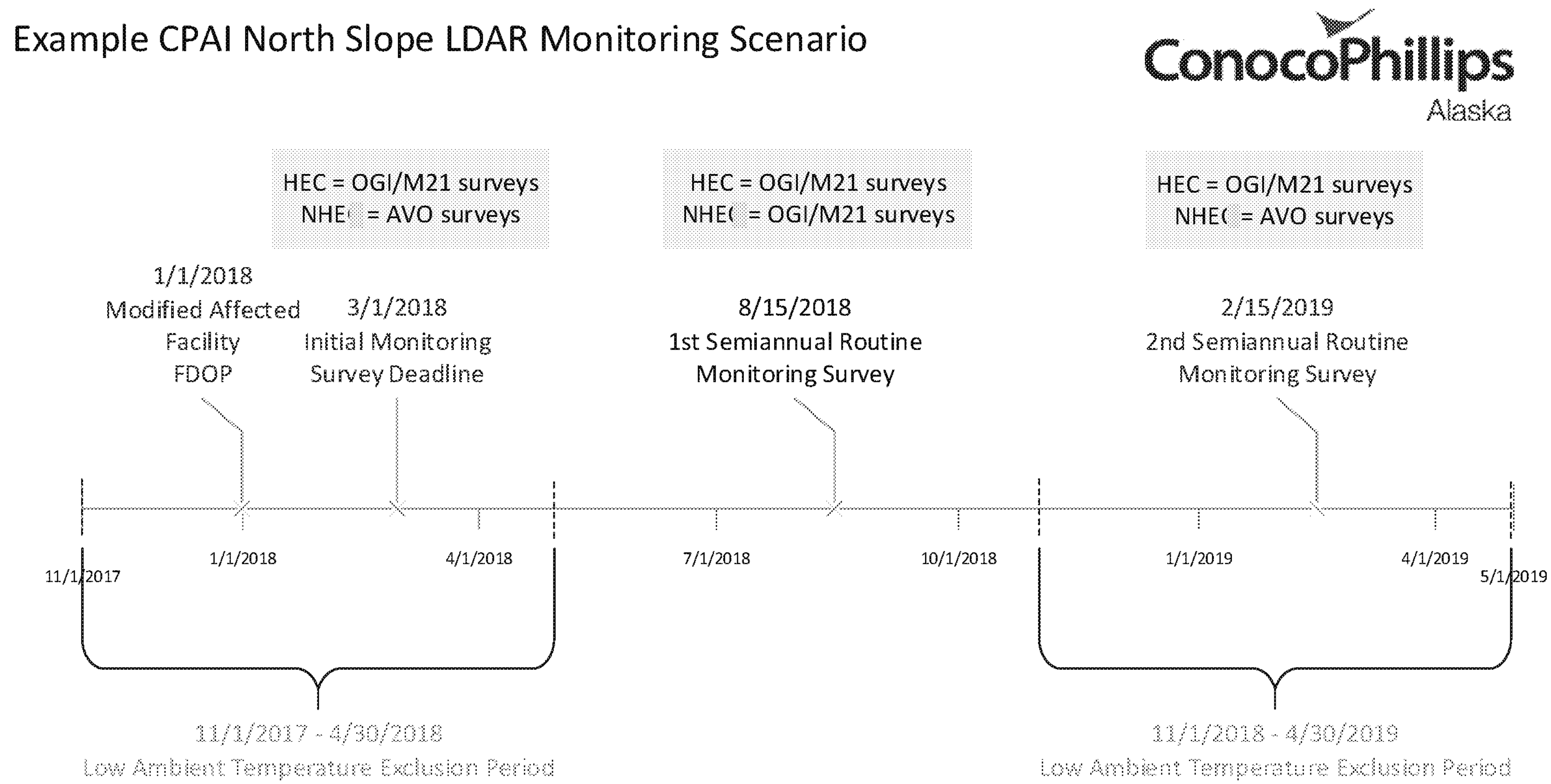
ii. NHE Locations: complete annual OGI or Method 21 surveys and conduct one AVO inspections during the next required semi-annual inspection (as a substitute for the OGI or Method 21 survey).

Currently, CPAI is only subject to the Well Site LDAR requirements in NSPS OOOOa, however the Compressor Station requirements could apply in the future. The technical limitations for conducting OGI or Method 21 inspections at Well Sites would also apply to Compressor Stations. Accordingly, CPAI requests that the proposed AMR concept described in this document for replacing OGI/Method 21 inspections at NHE locations with AVO inspections for monitoring surveys that fall within the LATEP also be available for any Compressor Stations located on the North Slope.

Figure 7 illustrates the proposed[1] AMR using the same timeline described above.

[1] Note, this timeline is designed to illustrate how AVO inspections will be used to replace OGI/Method 21 inspections for the AMR. It is not submitted as an actual, proposed monitoring schedule. Monitoring schedules will be created based on the applicability triggers and requirements governing consecutive monitoring events established in NSPS OOOOa.

Figure 7. Example Alternate Monitoring Request for Arctic Conditions



Red = regulatory monitoring survey deadlines that are technically infeasible to use OGI/Method 21 instruments at NHE(ocations

Black = regulatory monitoring deadlines where it is technically feasible to use OGI/Method 21 instruments at NHE(ocations

The USEPA has previously approved alternative monitoring requirements where technical infeasibility issues were identified with the prescribed LDAR monitoring techniques (e.g. ADI Control Number 0100078, M040011). For example, the USEPA approved an Alternate Monitoring Request allowing AVO inspections as a substitute for Method 21 surveys due to a physical limitation in the monitoring instruments ability to detect the presence of ethylene glycol (See Appendix C).

7.0 Summary

The unique, harsh ambient conditions in the Alaska North Slope create several challenges for conducting leak detection surveys using the monitoring instruments prescribed in NSPS OOOOa. The objective of the surveys is to identify and repair leaks; however, conducting surveys in conditions where the monitoring equipment is not designed to operate will produced inaccurate results where leaks may not be identified. This will prevent the regulation from achieving its desired objective.

Consistent with the intent of the Rule to identify and repair leaks, CPAI requests that the USEPA approve an Alternative Monitoring Request to allow AVO inspections for equipment that cannot be inspected using the prescribed monitoring techniques.

Approval of the AMR will provide the USEPA with confidence that CPAI is conducting field inspections for all affected equipment and any leaks identified are repaired in accordance with the NSPS OOOOa requirements. The AVO inspections will only be conducted for equipment where it is not technically feasible to conduct the prescribed OGI/Method 21 surveys. Approval of CPAI's AMR is consistent with the USEPA's previous determinations for LDAR regulations where there are technical limitations in the monitoring instruments.

Appendix A – OGI Manufacturer Operating Condition Specifications

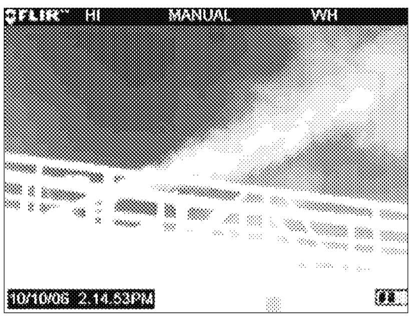
FLIR GF300/GF320

Infrared Camera for Methane and VOC Detection

The FLIR GF300/GF320 is a revolutionary infrared camera capable of detecting Methane and Volatile Organic Compound (VOC) fugitive emissions from the production, transportation, and use of oil and natural gas. This camera can scan large areas and visualize potential gas leaks in real-time, so you can check thousands of components over the course of one survey. Designed with the user in mind, the GF300/GF320 is lightweight, offers both a viewfinder and LCD monitor, and has direct access to controls. Embedded GPS data helps in identifying the precise location of faults and leaks, for faster repairs.

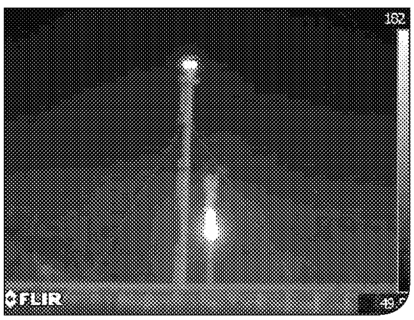
Visualize Gas Emissions in Real-time

The FLIR GF300/GF320 is unbeatable at detecting gas emissions, with a High Sensitivity Mode that lets you visualize even the smallest leaks in real-time. Use this visual verification to pinpoint the exact source of the emissions and begin repairs immediately. In addition, the GF320 is capable of measuring temperatures up to 350 °C with ±1 °C accuracy, allowing you to note temperature differentials and improve gas plume detection.



Increase Worker Safety

Surveys performed with GF300/GF320 cameras are nine-times faster than those performed with gas sniffers. They're also safer: optical gas imaging does not require close contact with components in order to detect gas. This reduces the risk of exposure to invisible and potentially harmful chemicals. In addition, the camera can scan areas of interest that are difficult to reach using conventional methods. The ergonomic design, with a bright LCD and articulated viewfinder, takes the strain out of a full day of surveys.



Stop Leaks, Save Money, Help the Environment

By fixing gas leaks, you can save your company thousands in lost gas and lost profits, while at the same time improving regulatory compliance and protecting the environment. The FLIR GF300/GF320 complies with all current regulations for Optical Gas Imaging (OGI). See our website for a full listing.

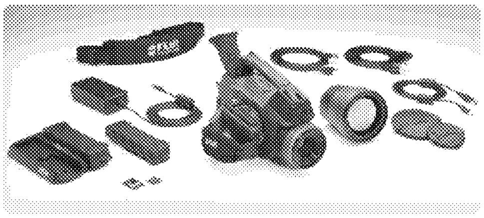
The GF300/GF320 detects the following gases:

Methanol	Methane	Benzene	Ethane	Propylene
Ethanol	Pentane	1-Pentene	Isoprene	Butane
Ethylbenzene	MEK	Toluene	Propane	Octane
Heptane	MIBK	Xylene	Ethylene	Hexane

Specifications

Model	GF300 / GF320
Detector Type	FLIR Indium Antimonide (InSb)
Spectral Range	3.2 – 3.4 μm
Resolution	320 x 240 pixels
Detector Pitch	30 μm
NETD/Thermal Sensitivity	<15 mK @ +30°C (+86°F)
Sensor Cooling	Stirling Microcooler (FLIR MC-3)
Electronics / Imaging	
Image Modes	IR Image, visual image, high sensitivity mode (HSM)
Frame Rate (Full Window)	60 Hz
Dynamic Range	14-bit
Video Recording / Streaming	Real-time non-radiometric recording: MPEG4/H.264 (up to 60 min./clip) to memory card Real-time non-radiometric streaming: RTP/MPEG4
Visual Video	MPEG4 (25 min./clip) to memory card
Visual Image	3.2 MP from integrated visible camera
GPS	Location data stored with every image
Camera Control	Remote camera control via USB
Measurement	
Standard Temperature Range	–20°C to +350°C (–4°F to +662°F)
Accuracy*	±1°C (±1.8°F) for temperature range (0°C, to +100°C, +32°F to +212°F) or ±2% of reading for temperature range (>+100°C, >+212°F)
Optics	
Camera f/number	f/1.5
Available Fixed Lenses	14.5° (38 mm), 24° (23 mm)
Focus	Automatic (one touch) or manual (electric or on the lens)
Image Presentation	
On-Camera Display	Built-in widescreen, 4.3 in. LCD, 800 x 480 pixels
Automatic Gain Control	Continuous/manual, linear, histogram
Image Analysis*	10 spotmeters, 5 boxes with max./min./average, profile, delta temperatures, emissivity & measurement corrections
Color palettes	Iron, Gray, Rainbow, Arctic, Lava, Rainbow HC
Zoom	1-8x continuous, digital zoom
General	
Operating Temperature Range	–20°C to +50°C (–4°F to +122°F)
Storage Temperature Range	–30°C to +60°C (–22°F to +140°F)
Encapsulation	IP 54 (IEC 60529)
Bump / Vibration	25 g (IEC 60068-2-27) / 2 g (IEC 60068-2-6)
Power	AC adapter 90-260 VAC, 50/60 Hz or 12 V from a vehicle
Battery System	Rechargeable Li-ion battery
Weight w/ Battery & Lens	1.94 kg (4.27 lbs)
Size (L x W x H) w/ Lens	305 × 169 × 161 mm
Mounting	Standard, 1/4"-20

* GF320 model only



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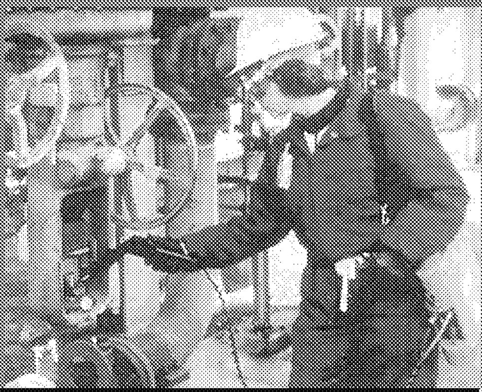
Appendix B – FID and PID Manufacturer Operating Condition Specifications



Product Overview

TVA1000B

Toxic Vapor Analyzer

The Only Portable Intrinsically Safe Dual PID/FID Analyzer

Analyze • Detect • Measure • Control™

Thermo ELECTRON CORPORATION

ED_004016I_00007711-00017

Portable Toxic Vapor Analyzer

The TVA1000B is the only over-the-shoulder portable vapor analyzer that offers both PID (Photo Ionization Detection) and FID (Flame Ionization Detection) in a single, easy-to-use instrument. The ability to utilize both technologies in this field proven instrument provides benefits in reduced weight and a single user interface. The user can easily monitor and log inorganic and organic vapors simultaneously.

FID Detection

Users can measure a wide variety of organic vapors over an impressive dynamic range (0-50,000 ppm), monitoring some compounds that the PID will not detect. The flame ionization detector operates by breaking hydrocarbon bonds and is not limited by the ionization potential of the molecule.

Simultaneous FID/PID Detection

No other instrument offers both Photo Ionization and Flame Ionization Detection operating simultaneously in a single portable vapor analyzer. Dual detection eliminates the time, expense and trouble of purchasing and maintaining two separate analyzers.

With PID detection, the user has not only the ability to monitor for organic compounds, but also can detect many inorganic compounds. Some compounds detected by PID and not FID are ammonia, carbon disulfide, carbon tetrachloride, formaldehyde, and hydrogen sulfide. The PID also has the advantage of not requiring fuel or air to operate. In anaerobic environments, the TVA1000B PID can be used.

Applications

Fugitive Emissions Monitoring
The unique dual detector FID/PID design can handle a wide range of compound vapors present at processing plants. The TVA1000B will permit monitoring at lower ppm levels.

Emergency Response
For reliable measurements of hazardous spills or emissions, the TVA1000B responds quickly in an emergency. The ability to quickly detect the presence of "hot spots" is key to locating the source of the hazard.

Hazardous Waste Site Evaluation
The TVA1000B allows quick and easy identification of the hazard location and quantifies the level of contamination.

Underground Storage Tanks
The TVA1000B is a primary tool for determining if a UST is leaking and the extent of the contamination.

Industrial Hygiene
The TVA1000B can help you maximize the effectiveness of your plant ventilation system, and identifies trouble spots. Use it to survey ambient vapor levels in specific breathing zones or in general plant environments, and log for furthur follow-up action.

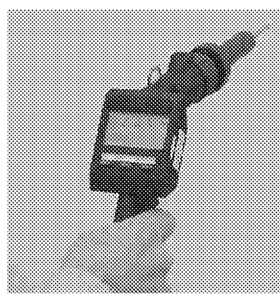
Natural Gas Leak Detection
The TVA1000B enables quick and easy detection of natural gas leaks.

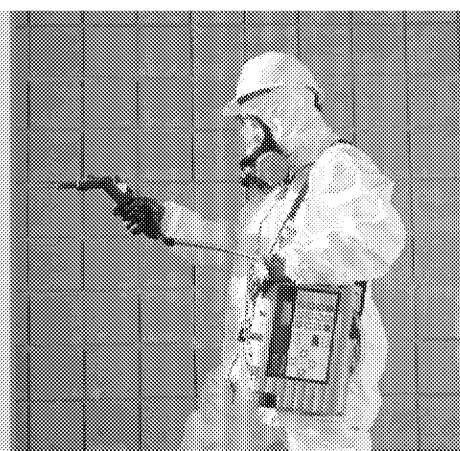
Key Features

- Simultaneous FID/PID or Single FID detector(s)
- Portable and lightweight
- Multiple response factors and curves
- Multi-point calibration
- On-board datalogging
- 8 hour battery life

Probe Options

- *Standard Probe*
  Display measurement values on a 4-character LCD, with measurement units displayed on %, ppm, or ppb. Additionally, a bar graph indicator provides an indication of concentration level. Function keys allow selection of analyzer functions.
- *Enhanced Probe*
  Originally designed for Fugitive Emissions monitoring, the enhanced probe has a larger display area than the basic probe. This provides a display of up to 6 lines x 20 characters, plus a double height concentration value. It displays all the same information as the standard probe and has menu-driven access to many of the analyzer functions, allowing them to be easily initiated and/or changed at the probe.





TVA1000B Data Manager Accessory: Route Management Probe

Powerful field capabilities
The TVA1000B Data Manager allows users to modify or create route data in the field, eliminating the need for manual recording of data. This helps you comply with the electronic data storage requirements within most consent decrees. The new probe has a highly visible 360 degree LED with a pulsed rate linked to concentration.

The DataManager provides access to all of the features previously available only through the sidepack. Users can also easily search and navigate between tags in a route by simply entering the desired tag identifier.

Flexibility and control
The DataManager allows control of how data is viewed and accessed in the field. This allows the user to customize the view to best meet the monitoring needs at your facility, as each route may have different fields and screen displays. Fields may be designated as non-editable to enhance data integrity and database security.

An optional comment field allows the user to make electronic notes about each tag monitored. An alpha-numeric keypad makes data entry a snap.

Key Features for the DataManager

- Custom field labels for more clearly identified route information
- Definable screen layouts optimize user efficiency
- Pick lists lead to consistent data entry and minimize chance of data entry errors
- One button selections to access most commonly used functions
- New sample probe provides 360 degree visual indicator of concentration level
- Cable management system eliminates snagging sample line and electronic cable
- Existing TVA1000 units may be upgraded
- Enhanced filtering system removes dirt and water more efficiently.

Analyzer bag protects TVA1000 and may be used with standard shoulder strap or optional framed backpack

ThermoConnect Software

ThermoConnect enables users of the TVA1000B to transfer, display, analyze, and configure data from the instrument using a computer. ThermoConnect is windows based and facilitates the importing of data into other Windows based applications making it easier to retrieve logged data.

Added capability to maximize the TVA DataManager's features

ThermoConnect has been updated with a powerful new utility to create new route database template files. This utility allows you to easily build your own route database and design the screen appearance through a four-step process. Also, any existing route files in the old file format are still recognized by the TVA and may be upgraded to the new format.

Complete DataManager System

The **TVA1000B** is a benchmark for experience and reliability in Fugitive Emissions Monitoring

TVA1000B Technical Specifications

Safety certifications	FM (Class 1, Div. 1, Groups A,B,C&D Hazardous Location, Temp. Class T4) CENELEC (Div. 1, Zones I and II Group IIC, Hazardous Location, Temp. Class T4)*
Datalogging	Onboard
Readout	Bar graph & 4- digit LCD
Dynamic Range	0.5-2,000 ppm (PID) isobutylene; 0.5-50,000 ppm (FID) methane
Linear Range	0.5-500 ppm (PID) isobutylene; 0.5-10,000 ppm (FID) methane
Response Time	3.5 seconds
Minimum Detectable Limit	100 ppb benzene (PID); 300 ppb hexane (FID)
Alarms	Low, high, STEL
Sample Flow Rate	1,000 cc/min nominal
Power	Rechargeable NiCd Battery
Logging Capacity	800-18,000 points mode specific
Temperature Range	0-40°C (32°F - 104°F)
Fuel	None required (PID); 99.995% hydrogen (FID)
Portable Operation Time	8 hours (with reference operating conditions)
Approximate Mass	5.8 kg (13 pounds)
Nominal Dimensions	13.5 x 10.3 x 3.2 inches (343 x 262 x 81 mm)
Analog Output	0-2V dc
Repeatability	+/- 1% (PID); +/- 2% (FID)
Autoranging	Yes
Diagnostics	Yes

Other Available Options:

Carrying Case	P/N CR012XL
Charcoal Filter	P/N 510095-1
FID Calibration Kit	P/N CR009UY
PID/FID Calibration Kit	P/N CR012UH

** Enhanced probe and DataManager not CENELEC certified as of publication date*

A world leader in high-tech instruments, Thermo Electron Corporation helps life science, laboratory, and industrial customers advance scientific knowledge, enable drug discovery, improve manufacturing processes, and protect people and the environment with instruments, scientific equipment and integrated software solutions.

Based in Waltham, Massachusetts, Thermo Electron has revenues of more than $2 billion, and employs approximately 11,000 people in 30 countries worldwide. For more information, visit www.thermo.com/ih

TÜV ISO 9001

Lit: TVAMC703

Environmental Instruments
First Responder /
Industrial Hygiene Products
27 Forge Parkway
Franklin, MA
02038

Analyze • Detect • Measure • Control™

Thermo
ELECTRON CORPORATION

search site...

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Product Categories
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- Breathing Air Systems & Ventilation Equipment
- Fall Protection
- Field Screening Kits
- Gas Detection
- Industrial Hygiene & Personal Monitoring
- Magnetic / Line Locators
- Power Supplies
- Soil / Sediment Sampling
- Specialized Instruments
- Supplies / Consumables
- Water Monitoring
- Water Sampling
- XRF Analyzers

Top Manufacturers
- RAE Systems
- YSI
- DBI
- Proactive
- Solinst
- Sensidyne
- Air Systems

All Manufacturers

You are: Home / Gas Detection / Multi Gas Monitors / 2-6 Gas Monitors /

MultiRAE

Manufacturer: RAE Systems

Order / Quote

Description | Specifications | Applications | Downloads

Size

- 7.6" H x 3.8" W x 2.6" D (193 x 96.5 x 66 mm)

Weight

- 31 oz. (880 g)

Sensors

- Over 30 intelligent interchangeable field-replaceable sensors including PID for VOCs, electrochemical sensors for toxic gases and oxygen, combustible LEL and NDIR sensors, and CO_2 NDIR sensor

PID sensors	Range	Resolution
VOC 10.6 eV (HR)	0 to 5,000 ppm	0.1 ppm
VOC 9.8 eV1	0 to 1,000 ppm	0.1 ppm
Combustible sensors		
Catalytic LEL	0 to 100% LEL	1% LEL
NDIR (0-100% LEL Methane)	0 to 100% LEL	1% LEL
NDIR (0-100% Vol. Methane)	0 to 100% Vol.	0.1% Vol.
Carbon Dioxide sensor		
Carbon Dioxide (CO_2) NDIR	0 to 50,000 ppm	100 ppm
Electrochemical sensors		
Ammonia (NH_3)	0 to 100 ppm	1 ppm
Carbon Monoxide (CO)	0 to 500 ppm	1 ppm
Carbon Monoxide (CO), Ext. Range	0 to 2,000 ppm	10 ppm
Carbon Monoxide (CO), H2-comp.	0 to 2,000 ppm	10 ppm
Carbon Monoxide (CO) and Hydrogen Sulfide (H_2S) Combo	0 to 500 ppm	1 ppm
	0 to 200 ppm	0.1 ppm
	0 to 50 ppm	0.1 ppm

Chlorine (Cl_2)		
Chlorine Dioxide (ClO_2)	0 to 1 ppm	0.03 ppm
Ethylene Oxide (EtO-A)	0 to 100 ppm	0.5 ppm
Ethylene Oxide (EtO-B)	0 to 10 ppm	0.1 ppm
Ethylene Oxide (EtO-C), Ext. Range	0 to 500 ppm	10 ppm
Formaldehyde (HCHO)	0 to 10 ppm	0.01 ppm
Hydrogen (H_2)	0 to 1,000 ppm	2 ppm
Hydrogen Chloride (HCl)	0 to 15 ppm	1 ppm
Hydrogen Cyanide (HCN)	0 to 50 ppm	0.5 ppm
Hydrogen Fluoride (HF)	0 to 10 ppm	0.1 ppm
Hydrogen Sulfide (H_2S)	0 to 100 ppm	0.1 ppm
Hydrogen Sulfide (H_2S), Ext. Range	0 to 1,000 ppm	1 ppm
Methyl Mercaptan (CH_3-SH)	0 to 10 ppm	0.1 ppm
Nitric Oxide (NO)	0 to 250 ppm	0.5 ppm
Nitrogen Dioxide (NO_2)	0 to 20 ppm	0.1 ppm
Oxygen (O_2)	0 to 30% Vol.	0.1% Vol.
Phosgene ($COCl_2$)	0 to 1 ppm	0.02 ppm
Phosphine (PH_3)	0 to 20 ppm	0.1 ppm
Phosphine (PH_3), Ext. Range	0 to 1,000 ppm	1 ppm
Sulfur Dioxide (SO_2)	0 to 20 ppm	0.1 ppm

Battery Options

- Rechargeable Li-ion (~12-hr. runtime, < 6-hr. recharge time)
- Extended duration Li-ion (~18-hr. runtime, < 9-hr. recharge time)
- Alkaline adapter with 4 x AA batteries (~6-hr. runtime)

Display

- Monochrome graphical LCD display (128 x 160) with backlighting
- Automatic screen “flip” feature

Display Readout

- Real-time reading of gas concentrations; PID measurement gas and correction factor; battery status; datalogging on/off; wireless on/off and reception quality
- STEL, TWA, peak, and minimum values

Keypad Buttons

- 3 operation and programming keys (Mode, Y/+, and N/-)

Sampling

- Built-in pump
- Average flow rate: 250 cc/min.
- Auto shutoff in low-flow conditions

Sensor Specifications - VOC's

- Range (ppm) 0 to 999.9 / Resolution (ppm) 0.1 / Response Time (T90) <3 sec
- Range (ppm) 1000 - 5,000 / Resolution 1 / Response Time (T90) <3 sec

Calibration

- Automatic with AutoRAE 2 Test and Calibration System1 or manual

Alarms

- Wireless remote alarm notification

- Multi-tone audible (95 dB @ 30 cm), vibration, visible (flashing bright red LEDs), and on-screen indication of alarm conditions
- Man Down Alarm with pre-alarm and real-time remote wireless notification

Datalogging

- Continuous datalogging (6 months for 5 sensors at 1-minute intervals, 24/7)
- User-configurable datalogging intervals (from 1 to 3,600 seconds)

Communication and Data Download

- Data download and instrument set-up and upgrades on PC via charging and PC comm. cradle, travel charger, or AutoRAE 2 Automated Test and Calibration System1
- Wireless data and alarm status transmission via built-in RF modem (optional)

Wireless Network

- RAE Systems Dedicated Wireless Network

Wireless Frequency

- ISM license-free bands

Wireless Range

- (Typical) 656 feet (200 meters)

Operating Temperature

- -4° to 122° F (-20° to 50° C)

Humidity

- 0% to 95% relative humidity (non-condensing)

Dust and Water Resistance

- IP-65 rating

Hazardous Location Approvals

- CSA: Class I, Division 1, Groups A, B, C and D, T4
- ATEX: 0575 II 2G Ex ia d IIC T4 Gb
- IECEx: Ex ia d IIC T4 Gb

CE Compliance (European Conformity)

- EMC directive: 2004/108/EC
- R&TTE directive: 1999/5/EC
- ATEX directive: 94/9/EC

EMI/RFI

- No effect when exposed to 0.43mW/cm2 RF interference from a 5-watt transmitter at 12"

Performance Tests

- MIL-STD-810F compliant. LEL CSA C22.2 No. 152; ISA-12.13.01

Languages

- Arabic, Chinese, Czech, Danish, Dutch, English, French, German, Indonesian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, and Swedish

Warranty

- 2 years on non-consumable components and catalytic LEL, CO, H_2S, and O_2 sensors
- 1 year on all other sensors, pump, battery, and other consumable parts

Additional equipment and/or software licenses may be required to enable remote wireless monitoring and alarm transmission

The CO + H_2S combo sensor is required for a 6-gas configuration

Specifications are subject to change

RETURN TO TOP OF PAGE

Appendix C – EPA AMR Approvals from the Applicability Determination Index

U.S. Environmental Protection Agency
Applicability Determination Index

Control Number: M040011

Category: MACT
EPA Office: Region 8
Date: 01/22/2004
Title: Leak Detection on Ancillary Equipment for Alt. Monitoring
Recipient: Betsy Wagner
Author: Martin Hestmark
Comments: See also ADI Control No. 0100078.

Subparts: Part 63, HH, Oil & Natural Gas Prod. Facilities

References: 61.241
61.242
61.243
61.244
61.245
61.246
61.247
63.761
63.761
63.769(c)

Abstract:

Q: Will EPA approve the alternative monitoring of quarterly visual inspections of equipment in ethylene glycol jacket water service (considered "in VHAP service") as a substitute for Method 21 under 40 CFR part 63, subpart HH at Chevron's Carter Creek Gas Plant in Evanston, Wyoming?

A: Yes. EPA has determined that quarterly visual inspections of equipment in jacket water service at a gas plant is an acceptable substitute for Method 21.

Letter:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 8 999 18TH STREET - SUITE 300 DENVER, CO 80202-2466 Phone 800-227-8917 http://www.epa.gov/region08

Ref: ENF-AT

Ms. Betsy Wagner
Regulatory Specialist
Chevron U.S.A. Production Company
1013 West Cheyenne Drive
Evanston, WY 82930

Re: MACT Subpart HH Affected Facility in Wyoming Alternative Monitoring for Leak Detection on Ancillary Equipment

Dear Ms. Wagner:

This letter is in response to your March 11, 2003, request for alternative monitoring under the National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities (40 CFR Part 63, Subpart HH). Specifically, you are seeking approval for alternative monitoring of ethylene glycol in jacket water service at the Carter Creek Gas Plant in Evanston, WY (AFS # 56-041-00009). Carter Creek Gas Plant is a sour natural gas processing plant designed with a nominal capacity to process 155 million standard cubic feet per day of sour inlet gas.

Pursuant to definitions in 40 CFR Part 63, Sec. 63.761, the jacket water service at the Carter Creek Gas Plant is considered "ancillary equipment" that operates "in VHAP service" since ethylene glycol is used in concentrations equal to or greater than 10 percent by weight. Therefore, pursuant to 40 CFR Sec. 63.769(a), equipment leak standards apply to the jacket water service since it is located at a natural gas processing plant and operates in VHAP service equal to or greater than 300 hours per calendar year. 40 CFR Sec. 63.769(c), requires the Carter Creek Gas Plant to follow the equipment leak standards specified in 40 CFR Part 61, Subpart V, Secs. 61.241 through 61.247. These sections specify Method 21 as the monitoring method with which to comply.

The jacket water at the Carter Creek Gas Plant is a mixture of ethylene glycol and water and it is used to cool various pieces of equipment throughout the plant. As stated in your letter, although the jacket water becomes hot during this process, the mixture exists in the system as a liquid, not as a gas. Ethylene glycol's high boiling point of 198øC, also ensures that any leak would be visible as a liquid (or a solid if the ambient temperature in Wyoming were to fall below ethylene's glycol's melting point of -11.5øC). An accurate measurement cannot be made using the portable field analyzer due to ethylene glycol's low volatility (vapor pressure = 0.06 mm Hg at 20øC). Therefore it is difficult to obtain a reproducible and useful response factor as required in EPA Reference Method 21. This is described in EPA report EPA-453/R-95-017, "Protocol for Equipment Leak Emission Estimates". Appendix D of this report provides a detailed listing of published Response Factors for ~190 compounds at actual concentrations of 10,000 ppmv and 500 ppmv for 6 different analyzers. Due to its low volatility, no useable response factors could be developed for ethylene glycol (EPA Reference Method 21 Sec. 8.1.1.2 states that the response factor for each individual VOC to be measured shall be less than 10).

Due to the limitation in the application of Method 21 to ethylene glycol, you have proposed to substitute quarterly visual inspections of the equipment in jacket water service. Visual evidence of ethylene glycol liquid on or dripping from the equipment in jacket water service would indicate an equipment leak, and repair would be conducted meeting the requirements of Part 61, Subpart V. This proposed alternative monitoring is consistent with a previously approved request that is posted on EPA's Applicability Determination Index (Control Number: 0100078) where quarterly visual monitoring was accepted as a substitute for Method 21 which was required under Part 60, Subpart VV for ethylene glycol service.

Pursuant to the General Provisions of 40 CFR Section 63.8(b)(ii), monitoring shall be conducted as set forth in this section and the relevant standards unless the Administrator approves the use of an intermediate or major change or alternative to any monitoring requirements or procedures. Based on our review of Chevron's request, we have determined that the proposed alternative monitoring is acceptable as a substitute for Method 21 for the equipment in jacket water service at the Carter Creek Gas Plant.

By email dated 12/29/03 we notified Wyoming Department of Environmental Quality (WDEQ) of our determination and approval of Chevron's alternative monitoring plan. Robert Gill of WDEQ responded with their agreement via email dated 1/5/04.

This alternative monitoring does not alter any of the other requirements of Part 61, Subpart V or Part 63, Subpart HH which may apply to these facilities. If you have any questions regarding this letter, please contact Cindy Beeler of my staff at 303-312-6204 or Beeler.Cindy@epa.gov.

Sincerely,

Martin Hestmark, Director
Technical Enforcement Program

cc: Robert Gill, WDEQ
Gregory Fried, OECA HQ

U.S. Environmental Protection Agency
Applicability Determination Index

Control Number: 0100078

Category: NSPS
EPA Office: Region 4
Date: 10/02/2001
Title: Alternative Monitoring Proposal for Ethylene Glycol Vapor
Recipient: Robert L. Barnes
Author: Winston A. Smith

Subparts: Part 60, VV, SOCMI Equipment Leaks

References: 60.482-4
60.482-7
60.484

Abstract:

Q: A company has proposed to conduct quarterly visual inspections of equipment in ethylene glycol vapor service, instead of using Method 21. Since ethylene glycol has a boiling point of approximately 197 degrees centigrade, any vapor escaping from process equipment would quickly condense and form a liquid, making detection by Method 21 less accurate and reliable. Is the use of visual inspections acceptable?

A: Yes. The proposed alternative monitoring is acceptable as a substitute for Method 21.

Letter:

October 2, 2001

4APT-ARB

Mr. Robert L. Barnes
Environmental Affairs
Eastman Chemical Company
P.O. Box 511
Kingsport, Tennessee 37662

Dear Mr. Barnes:

We have received your August 29, 2001, letter requesting a determination of equivalent means of emission limitation for equipment subject to New Source Performance Standards (NSPS) Subpart VV - "Standards of Performance for Equipment Leaks of Volatile Organic Compounds (VOC) in the Synthetic Organic Chemicals Manufacturing Industry." As indicated in your request, process emission source B-226P-1 at Eastman Chemical will be subject to Subpart VV which requires monitoring of equipment in ethylene glycol vapor service by using Method 21 to comply with Sec. 60.482-4 (pressure relief devices in gas/vapor service) and Sec. 60.482- 7 (valves in gas/vapor service and in light liquid service). Due to the limitation in the application of Method 21 to ethylene glycol vapor, you have proposed to substitute quarterly visual inspections of equipment in ethylene glycol vapor service for process unit B-226P-1, instead of using Method 21. We have reviewed your request and have determined that the proposed alternative monitoring is acceptable. Since your request constitutes a proposed alternative monitoring procedure instead of an equivalent emission limit, the requirements of Sec. 60.484 will not be applicable.

As you have described in your letter, since ethylene glycol has a boiling point of approximately 197 degrees centigrade, any vapor escaping from the process equipment would quickly condense and form a liquid. You have indicated that this would make detection by Method 21 less accurate and reliable than sensory monitoring, since ethylene glycol vapor would condense in the probe of the monitoring device and would not reach the flame ionization detector. You have indicated that calibration adjustments would serve little or no purpose, and there would be a high probability that leaks that are detectable through sensory monitoring would not be detected by Method 21.

In addition to the issues addressed in the Eastman Chemical request, we have found documentation indicating that Method 21 would not be suitable for detecting leaks from equipment in ethylene glycol vapor service. As indicated in Appendix D of the document entitled "Protocol for Equipment Leak Emission Estimates" (EPA 453/R-95-017), a response factor was not determined for ethylene glycol at a concentration of 10,000 ppmv for use in Method 21, due to its low volatility. As stated in Sec. 60.482-7, an instrument reading of 10,000 ppm or greater is an indication of a leak.

As an alternative to Method 21, Eastman Chemical has proposed to conduct quarterly visual inspections of equipment in ethylene glycol service for process unit B-226P-1. Visual evidence of ethylene glycol liquid on or dripping from the equipment in ethylene glycol vapor service would indicate an equipment leak, and repair would be conducted as required by Sec. 60.482-4 and Sec. 60.482-7. You have indicated in your letter that the proposed alternative would qualify for a determination of equivalent means of emission limitation under Sec. 60.484.

Based on our review of Eastman Chemical's request, we have determined that the proposed alternative monitoring is acceptable as a substitute for Method 21 for process unit B- 226P-1. While you have indicated that your request is for an equivalent emission limit, it is actually a request for an alternative monitoring procedure and will not be required to meet the requirements of Sec. 60.484.

If there are any questions regarding this letter, please contact Mr. Keith Goff of the Environmental Protection Agency Region 4 staff at (404)562-9137.

Sincerely yours,

Winston A. Smith
Director
Air, Pesticides, and Toxics
Management Division

cc: Barry Stephens
Tennessee Division of Air Pollution Control